Claims

1. ~~A fusion protein comprising~~

   (a) at least one binding domain specifically recognising an epitope of a plant pathogen; and

   (b) at least one further domain comprising a protein or peptide sequence which is toxic to the pathogen or detrimental to its replication, transmission or life cycle.

2. The fusion protein of claim 1 wherein said domains are linked by covalent or non-covalent bonds.

3. The fusion protein of claim 1 or 2 wherein the toxic activity of the protein or peptide sequence is activated by the presence of the pathogen, a component thereof or a component of a host cell.

4. The fusion protein of claim 3 wherein the toxic activity of the protein or peptide sequence is activated by a pathogen specific or host cell protease.

5. The fusion protein of claim 1 wherein said binding domain comprises an antibody, a T-cell receptor, a pathogen specific receptor, a peptide specific for an epitope of a pathogen, or at least the binding site of any one of those.

6. The fusion protein of claim 5 wherein said antibody or binding site thereof is a recombinant full-size antibody, dimeric secretory IgA antibody, multimeric IgM antibody, $F(ab')_2$-fragment, Fab-fragment, Fv-fragment, single chain Fv antibody (scFv), bispecific scFv, diabody, single domain antibody (dAb), minibody or molecular recognition unit (MRU), derived from hybridoma cells, synthetic, semi-synthetic, naïve and immunocompetent phage display or ribosome display libraries, or by the generation of fully synthetic designer antibodies.

7. The fusion protein of ~~any one of claims 1 to 6,~~ claim 1 comprising at least two binding domains for the same or different epitope(s).

8. The fusion protein of claim 7 wherein said epitopes are from the same or different pathogen(s).

9. ~~The fusion protein of any one of claims 1 to 8~~ claim 1 wherein the toxin is an enzyme or a viral structural or non-structural ~~protein~~ or a binding domain as defined in ~~any one of claims 1 to 8~~ claim 1.

10. The fusion protein of claim 9 wherein said enzyme is chitinase or glucanase, glucose oxidase, superoxide dismutase, DNAse or RNAse or RIP or lipase or active fragments thereof either singly or in any combination(s).

11. The fusion protein of ~~any one of claims 1 to 10~~ claim 1 wherein the pathogen is a virus, bacterium, mycoplasma, fungus, nematode or insect.

12. The fusion protein of ~~any one of claims 1 to 11~~ claim 1 wherein at least one of said domains is fused to a C- or N-terminal carrier protein.

13. The fusion protein of ~~any one of claims 1 to 12~~ claim 1 wherein at least one of said domains comprises a fluorophore.

14. ~~A pathogenicide comprising at least one binding and/or further domain as defined in any one of claims 1 to 13~~ claim 1 and a cellular targeting sequence and/or membrane localisation sequence ~~and/or motif that leads to membrane anchoring.~~

15. The pathogenicide of claim 14 wherein the membrane localisation sequence is proteolytically sensitive.

16. The pathogenicide of claim 14 or 15 wherein said membrane localisation sequence is human T cell receptor transmembrane domains or any other member of the immunoglobulin superfamily, glyco-phosphatidyl inositol (GPI)

anchors, KAR1, middle-T antigen, cytochrome b5 or syn1.

17. The pathogenicide of ~~any one of claims 14 to 16~~ claim 14 comprising the fusion protein of ~~any one of claims 1 to 13~~ claim 1.

18. The fusion protein of ~~any one of claims 1 to 13~~ claim 1 or the pathogenicide of ~~any one of claims 14 to 17~~ claim 14 wherein said binding domain(s) and/or said further domain(s) are capable of self assembly in vivo.

19. A pathogenicide comprising at least one binding domain as defined in ~~any one of claims 1 to 6~~ claim 1, wherein at least one of said binding domains specifically recognizes a viral movement and/or replicase protein.

20. The pathogenicide of claim 19 which comprises an antibody.

21. A polynucleotide encoding the fusion protein of any one of claims 1 to 13 or 18 or the pathogenicide of ~~any one of claims 14 to 20~~ claim 14.

22. A vector comprising the polynucleotide of claim 21.

23. A vector comprising separate polynucleotides encoding at least one of said binding domain(s) and/or said further domain(s) of the fusion protein of any one of claims 1 to 13 or 18 or the pathogenicide of ~~any one of claims 14 to 20~~ claim 14.

24. A composition comprising vectors wherein each vector contains at least one polynucleotide encoding at least one binding domain and/or at least one further domain of the fusion protein of any one of claims 1 to 13 or 18 or the pathogenicide of ~~any one of claims 14 to 20~~ claim 14; and wherein the expression of at least two of said polynucleotides results in the production of said fusion protein or said pathogenicide or assembly of the same in vivo.

25. The vector of claim 22 or 23 or the composition of claim 24 wherein the polynucleotide is operatively linked to regulatory sequences allowing the expression of the fusion protein, pathogenicide or the domains thereof in a

host cell.

26. The vector or composition of claim 25 wherein said regulatory sequence is a constitutive, chimeric, ubiquitous, tissue specific, organ specific or inducible promoter.

27. A host cell comprising the polynucleotide of claim 21, the vector of any one of claims 22, 23, 25 or 26, or the composition of any one of claims 24 to 26.

28. A method for the production of a molecular pathogenicide comprising:
(a) culturing the host cell of claim 27 under conditions suitable for the expression of the polynucleotide; and
(b) recovering the fusion protein, pathogenicide or the domains thereof from the culture.

29. A molecular pathogenicide obtainable by the method of claim 28 or encodable by the polynucleotide of claim 21.

30. A method for the production of pathogen resistant transgenic plants, plant cells or plant tissue comprising the introduction of a polynucleotide of claim 21, the vector of claim 22, 23, 25 or 26 or the vectors of the composition of any one of claims 24 to 26 into the genome of a plant, plant cell or plant tissue.

31. A transgenic plant cell which contains stably integrated into the genome a polynucleotide of claim 21, a vector of claim 22, 23, 25 or 26 or the vectors of the composition of any one of claims 24 to 26 or obtainable according to the method of claim 30.

32. A transgenic plant or plant tissue comprising plant cells of claim 31 or obtainable by the method of claim 30.

33. The transgenic plant of claim 32 wherein the fusion protein or pathogenicide are made functional against pathogens by *in vivo* assembly after co-transformation of at least two independent plant expression constructs or after

sexual crossing to form hybrid offspring from two parental plants expressing one or more of the domains of the fusion protein or the pathogenicide, or any other form of genetic recombination.

34. The transgenic plant of claim 32 or 33 which displays improved resistance against a pathogen that the wild type plant was susceptible to.

35. Harvestable parts or propagation material of a plant of any one of claims 32 to 34 comprising plant cells of claim 31.

36. A kit comprising the fusion protein of any one of claims 1 to 13 or 18, the pathogenicide of any one of claims 14 to 20, the polynucleotide of claim 21, the vector of claim 22, 23, 25 or 26, the composition of any one of claims 24 to 26 or the molecular pathogenicide of claim 29.

37. Use of the fusion protein of any one of claims 1 to 13 or the pathogenicide of any one of claims 14 to 20, the polynucleotide of claim 21, the vector of claim 22, 23, 25 or 26, the composition of any one of claims 24 to 26 or the molecular pathogenicide of claim 29 for the protection of a plant against the action of a pathogen.

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